

Present Status of Childhood Thyroid Carcinoma in Belarus following the Chernobyl Accident

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Introduction

In April, 1996, a joint international conference ("One Decade after Chernobyl") was held in Vienna, Austria in cooperation with the International Atomic Energy Agency (IAEA), the World Health Organization (WHO) and the European Commission (EC).

In this meeting, they came to the conclusion that the abnormality of health condition definitely related to the Chernobyl accident was only thyroid cancer in children for the moment. On the other hand, they reported that it would be too early to give comments scientifically on leukemia and other disorders.

It has been already known that the incidence of pediatric thyroid cancer in Belarus, Ukraine and the Russian Federation is rapidly increasing after 1990. About 800 children in these 3 CIS countries have been treated surgically until the end of 1995. More than half of them were found in Belarus. Furthermore,

according to the final report of the Vienna international conference, several thousands of patients with thyroid cancer, who were less than 15 years old at the time of the Chernobyl disaster, may appear in the future although scientific proof is difficult. Considering seriousness of the prediction, appropriate measures should be taken as soon as possible in these highly contaminated countries.

In the present report, we provide the present status of pediatric thyroid cancer in Belarus. In 1990 after the Chernobyl breakdown, the government of Belarus established the National Thyroid Cancer Center following a rapid increase of childhood thyroid carcinoma, as a special institute for not only clinical services but also basic researches. Dr. Demidchik E.P., a professor of the department of Oncology, Minsk Medical Institute was elected the director of the Center. Additionally, it has been also decided that surgery for all cases of the pediatric thyroid cancer in Belarus

Table 1. Number of thyroid cancer in Belarus before and after the Chernobyl Accident

Period	Adults (more than 15)	Children (under 15)
1975-1985	1,342	7
1986-1996	4,006	508

Table 2. Age distribution of children with thyroid cancer in 1986-1995 (age at the time of the accident)

Region	Total population*, thousands	Number of thyroid cancer children	Number of cancer by age		
			0 - 4	5 - 9	10 - 14
Brest region	1,520	97	68	27	2
Vitebsk region	1,300	7	4	3	0
Gomel region	1,670	225	149	72	4
Grodno region	1,160	24	12	11	1
Minsk region	1,410	20	14	5	1
Mogilev region	1,270	21	14	6	1
Minsk city	1,630	26	17	8	1
Belarus	9,960	420	278	132	10
%		100	66.2	31.4	2.4

* Adult people is included (data in 1986).

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should be performed here at the Center. The data described herein were composed of the operative results in those children with histopathological proof of thyroid cancer after surgical treatment at the Center.

Childhood thyroid carcinoma in Belarus after Chernobyl

The number of patients with thyroid cancer in both children and adults in Belarus is shown in Table 1. During the 11 years before the Chernobyl explosion (1975-1985), there were only 7 cases of pediatric thyroid cancer. However, in the same duration after the accident (1986-1996), the number of pediatric patients was 508 with remarkable increase, which was 72 times compared with the pre-accident period. Meanwhile, with respect to adult patients, the number of thyroid cancer in the former period was 1,342 and in the latter - 4,006. It increased in about 3 times compared with the pre-accident duration. In cases of adults, the increase of the incidence of thyroid cancer might be due to not only the recent improvement of diagnostic procedures, but also the frequent medical examinations after the accident. It is, therefore, necessary to continue more precise and detailed investigations in the future.

When all of the 508 children with thyroid cancer are classified with accord to their birth places (Regions in Belarus) as depicted in Fig. 1, there is found an apparent geographical feature proving that the majority of pediatric patients was born in the highly contaminated areas; 268 patients in Gomel Region (52.8%) and 122 in Brest Region (24.0%). Furthermore, dividing their birthday into 3 groups; i.e.

pre-accident, at the time of the accident and post-accident, 497 cases belong under the pre-accident group (97.8%), 6 under the time of the accident (1.2%), and 5 under the post-accident group (1.0%). It has been clarified that most of the children are grouped into the pre-accident category.

The age distribution at the time of the Chernobyl breakdown in 420 children operated until 1995, demonstrated as follows: 0-4 years old was 66.4%, 5-9 years old - 31.4%, and 10-14 years old - 2.4%. More than half of the patients were classified into markedly young-aged population (Table 2 and Fig. 2). Four children born after the accident were excluded.

The annual frequency of the pediatric thyroid cancer in Belarus before the accident was 0.1 per 100,000 children, which is almost the same level as all over the world. However, after the accident, those levels were gradually elevating: i.e., 1.2 in 1990, 2.8 in 1992, 3.5 in 1994, 4.0 in 1995, and 3.8 in 1996. In the highly contaminated Gomel Region, the yearly incidence after the breakdown was as follows: 3.6 in 1990, 11.3 in 1991, 13.4 in 1995 and 12.0 in 1996, respectively. All of these values after 1991 were more than 100 times compared with that of the world. In Brest region, the incidence in 1996 was also high, 7.3. On the other hand, in Vitebsk Region, the less contaminated area, no pediatric thyroid cancer has been found since 1993.

These several clinicoscintific data shown here strongly suggest that childhood thyroid carcinoma rapidly increasing in Belarus has been attributed to radioactive contamination by the Chernobyl accident. In particular, radioactive iodine would be a main carcinogenic factor on the thyroid gland. Physiologically, the thyroid gland concentrates iodine for the synthesis of thyroid hormone. It is, therefore, generally accepted that radiation-induced thyroid

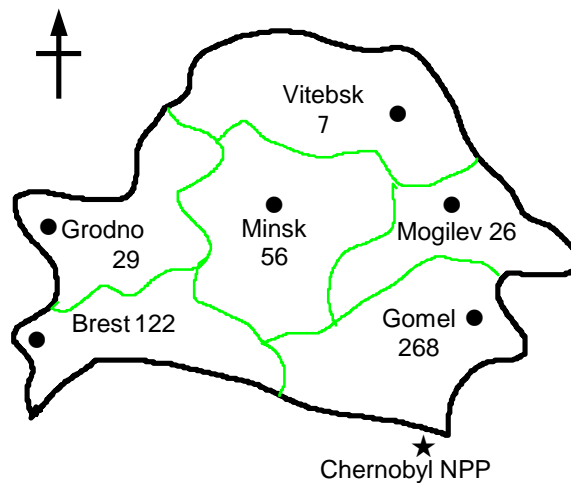


Fig. 1 Geographical distribution of child thyroid cancer in Belarus (1986-1996: 508 cases)

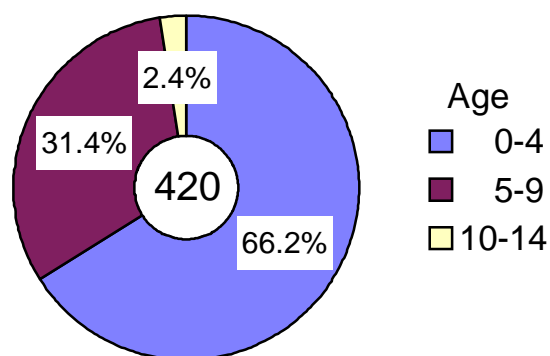


Fig. 2 Age structure of children with thyroid cancer (age at the time of the accident)

cancer after a radionuclide-releasing event would be initiated through this pathway. However, the exact and precise mechanisms of carcinogenesis have not been elucidated yet. Moreover, it is also extremely difficult to prove the initiation process of carcinoma directly. Further basic investigations should be extensively continued.

The recent change in childhood thyroid carcinoma has demonstrated a gradual decrease of the patient number showing 91 cases in 1995, 84 in 1996 and 27 till the end of May 1997. On the contrary, teenager patients with thyroid cancer older than 15 years old are apparently increasing since 1993; i.e., 4 cases in 1990, 1 in 1991 and 1992, 25 in 1993, 21 in 1994, 25 in 1995, and 26 till the end of October 1996, respectively. In this teenager group, the same geographic characteristic is also observed as the children previously described; that is, 70% of the operated patients have been sent to this Center from both Gomel and Brest Regions. These facts suggest that the incidence of thyroid malignancy in teenagers and young adults progressively is increasing instead of children.

Problems for the near future

At present, those patients with thyroid carcinoma who had undergone radical surgery at the time of their childhood are reaching adolescence or youth. They are carefully thinking over their own future life. Particularly, young women are seriously worrying

about marriage, pregnancy and delivery. Moreover, they really fear hereditary effects on their new-born babies. Some of them, therefore, are considering to avoid marriage and/or delivery.

Judging from these sad matters, health consequences of the Chernobyl disaster have definitely just emerged. Hence it appears that socio-psychosomatic cares will become exceedingly crucial means in the near future for not only children in the growing-up stage, but also their parents. We should keep in mind that there is a need for educational programs of this aspects as a trial of humanitarian medical supports.

References

1. ONE DECADE AFTER CHERNOBYL: Summing Up the Consequences of the Accident, Proceedings of an International Conference, Vienna, 8-12 April 1996, IAEA STI/PUB/1001.
2. Kazakov V.S., Demidchik E.P., Astakhova L.N. et.al., Thyroid Cancer after Chernobyl, *Nature* 359, 21-22, 1992.
3. Socalow E.L., Hashizume A., Nerishi S. et al., Thyroid Carcinoma in Man after Exposure to Ionizing Radiation, *N.Engl.J.Med.*, 268, 406-410, 1963.
4. Maron H., Thomas S., Saenger E., et al., Ionizing Radiation and the Induction of Clinically Significant Disease in the Human Thyroid Gland, *Am.J.Med.*, 63, 967-978, 1997.